

THE additions to the Zoological Society's Gardens during the past week include a Weeper Capuchin (*Cebus capucinus*) from Brazil, presented by Major F. J. Ricarde Seaver; a Common Otter (*Lutra vulgaris*), European, presented by Mr. J. Herbert; a Grey Squirrel (*Sciurus cinereus*) from North America, presented by Mrs. M. E. Symons; a Yarrell's Curassow (*Crax carunculata*) from South-east Brazil, presented by Mr. Aug. Ceiyoto; a Scaup Duck (*Fuligula marila*), European, presented by Mr. H. Colliver; two Common Thicknees (*Edicnemus crepitans*), European, presented by Mr. J. E. Harting; a Coati (*Nasua nasica*) from South America, two Silky Marmosets (*Midas rosalia*) from Rio Janeiro, Brazil; five Graceful Pigeons (*Columba speciosa*) from South America, purchased; a Molucca Deer (*Cervus moluccensis*), born in the Gardens.

### SCIENTIFIC SERIALS

THE current number of the *Journal of Anatomy and Physiology* commences with a paper by Dr. A. Ransome on the relative powers of fresh and previously used pepsine in the digestion of albumen, in which it is demonstrated that pepsine has greater activity after it has been used than when fresh, in which respect it is shown to agree with ptyalin, as shown by Dr. Foster, and with pancreatin according to Thiersch.—Following is a contribution on the anatomy of the cutis of the dog, by Dr. Stirling, with two plates, republished from the *Berichte d. Math. Phys. Classe der Königl. Sächs. Gesel. d. Wiss.*, 1875.—Mr. R. H. A. Schofield makes observations on taste-goblets in the epiglottis of the dog and cat, closely resembling the same structure in the tongue.—Dr. J. Blake, of San Francisco, describes the physiological action of the salts of beryllium, aluminium, yttrium, and cerium, by injecting them into the blood.—Dr. Brunton shows that Condurango is physiologically inert.—Mr. J. C. Ewart has a note on the abdominal pores and urogenital sinus of the lamprey, in which he demonstrates that the ureters and internal abdominal pores open into a urogenital sinus which opens behind the rectum on a papilla.—Mr. E. Thurston determines the length of the systole of the heart, as estimated from sphygmograph tracings, in which, from a series of measurements, he verifies Mr. A. H. Garrod's law that in health the systole, as indicated in the radial artery, is constant for any pulse-rate, and varies as the cube root of the rapidity.—Mr. A. M. Marshall explains the mode of oviposition of *Amphioxus*, verifying Kowalevsky's observation that the ova escape by the mouth.—Mr. F. Darwin describes the structure of the snail's heart histologically. No nervous mechanism was found. The contractile tissue is striated, and the fibres of the auricle and ventricle are continuous.—Dr. Stirling notes the effects of division of the sympathetic nerve in the neck of young animals.—Prof. Turner describes the structure of the non-gravid uterine mucous membrane in the kangaroo, and makes a note on the dentition of the narwhal.—Mr. F. M. Balfour continues his valuable account of the development of the Elasmobranch fishes, with five excellent plates and many woodcuts.—Mr. P. H. Carpenter makes remarks on the anatomy of the arms of Crinoids, his results being arrived at from sections of decalcified specimens.—Dr. Foster describes some effects of Upas Antiar on the frog's heart, demonstrating that the resulting tetanus is brought about by an extraordinary prolongation of the diastole, and not by a too rapid sequence of beats. The arguments for and against the existence of both accelerator and inhibitory fibres in the heart are discussed, in relation with the influence of antiar; and the assumption of the existence of specific accelerator fibres is shown to be unnecessary.—Dr. Curnow notes variations in the arrangement of the extensor muscles of the fore-arm.—Dr. Brunton explains a simple method of demonstrating the effect of heat and poisons upon the heart of the frog.—Mr. G. A. Berry and Prof. Rutherford note with reference to Pflüger's law of contraction, that the excitability and length of the portion of nerve traversed by the voltaic stream must be taken into account in studying the changes of the electrotonic state.—Prof. Rutherford notes with regard to the action of the internal intercostal muscles, their elevating action, as rendered evident by binding similarly situated elastic bands to the ribs themselves.—Mr. Reoch has a paper on the oxidation of urea.—Mr. R. Hughes describes an improved freezing microtome, in which ether spray is the cold-producer.—Dr. S. Coupland records an example of Meckel's diverticulum in man.—The Report on Physiology, by Dr. Stirling, concludes the number.

*Foggendorff's Annalen der Physik und Chemie.* Ergänzung, Band vii. Stück 2.—In this number is concluded M. Voigt's paper on determination of the constants of elasticity of rock salt; the case of torsion being here dealt with. Comparing his general results with Navier and Poisson's theory, he finds they contradict it in some points, e.g. the crystals of the regular system do not behave, in reference to elasticity, like uncrystalline media; for the bending and torsion coefficients are not independent of the direction; the constants also have different relative values.—M. Obach describes some interesting experiments on the behaviour of amalgams and metallic alloys under the galvanic current. He finds (1) that the current does not produce in either electrolytic separation of the constituents; (2) that sodium amalgam, after being traversed by the current, decomposes water at both poles as before; (3) that action of the current alters neither the hardness nor malleability of tin-lead alloys, nor the liquid state of potassium-sodium alloy. It works in the chemical composition of the alloy near the electrodes no changes exceeding errors of experiment and analysis. In all these points the author opposes M. Gerardin, who, a short time ago, published experiments on the subject. As to the electric currents occurring in amalgamation of metals, M. Obach regards them as thermo-electric currents due to the temperature changes produced by amalgamation.—M. Clausius contributes a lengthy memoir on the proposition of the mean ergal and its application to the mechanical motions of gases; and a paper by M. Weinberg treats of the application of the mechanical equivalent of heat to molecular forces, size, and distance.

*Zeitschrift der Oesterröichischen Gesellschaft für Meteorologie*, Jan. 1.—An article extracted from the Proceedings of the Vienna Academy, containing the results of Prof. Kerner's studies and observations, in the neighbourhood of Innsbrück, on the abnormal rise of temperature with increasing elevation in the valleys of the Alps in late autumn and in winter, occupies nearly the whole of this number. The phenomenon occurs every year without fail in this district, and has been observed in Carinthia, Upper Austria, the Tyrol, and Switzerland. The number of farm-houses upon the mountain sides at an inconvenient distance from the pastures below shows that the inhabitants are well aware of the milder climate to be found at moderate altitudes. While frost reigns in the valleys and trees are leafless, the grass and trees upon the heights frequently keep beautifully green, and flowers that bloom elsewhere in autumn and even in spring bloom in the genial air. The valley folk say at such times that the south wind blows aloft and will soon descend to them. Prof. Kerner acknowledges the plausibility of this notion, but gives good reasons for believing it to be ill-founded. It is true that the equatorial current does descend upon the valleys, gradually displacing the polar, but in the first half, at least, of the period of reversed temperature, none of the signs of a south wind appear in the atmosphere, barometric pressure keeps very high, and the sky clear. The latest uncommonly long spell of seventeen days with reversed temperatures, from Oct. 25 to Nov. 10, 1874, enabled Herr Kerner to ascertain the real cause of the strange and hitherto perplexing phenomenon. From an ascent of the Unnütz (2,111 metres), he learnt that the warm region in every valley lies between two cold regions, whose borders differ in position in every valley. The situation of the nether border of the warm region certainly depends on the height of the bottom of the valley. He reached this border at about 200 metres above the level of the Inn, or 700 metres above the sea, and passed out of the warm region into an atmosphere colder than that of the valley at 1,890 metres above the sea. In crossing the Achnenthal at 950 metres, there was a fall of the thermometer, which was soon succeeded by a rise as he continued to climb. In descending the favoured slopes of the mountain he observed several kinds of flowers, some of which generally come out in spring; but a little lower all vegetation was sprinkled with hoar frost. In making his ascent on the sunny side an upward current accompanied him. On the summit a very slight air came from N.E. as long as the sun kept high. Late in the afternoon it had risen to a fresh breeze, and after sunset the N.E. wind was violent. He then made a short descent on the N.E. slope to about 30 or 40 metres from the top. Here he found a calm, and a little lower a breeze blowing down towards the valley. It appeared accordingly that the polar wind divided itself near the top into two streams, one of which turned down into the valley, while the other flowed over the top and then down into the other valley at the foot of the southern slope. This distribution of

currents seemed to him to point to a reason for the existence of a warm region, like that which Herr Hann found for the high temperature of the Föhn wind, namely, that in descending the cold air becomes condensed, and by condensation raised in temperature. From 4 P.M. on the 4th to 5 P.M. on the 5th of November, 1874, readings of the temperature were taken by four observers at Innsbrück (575 metres), Rumer Alpe (southern slope, 1,227 metres), Heiligwasser (northern slope, 1,239 metres), and at the summit of the Blaser (2,240 metres). The mean temperatures for the twenty-four hours at these stations were respectively, 2.16, 7.06, 4.26, and -64. The lowest night temperature at Innsbrück was -2.8; on the Rumer Alpe, +2.4. The minimum was reached at Innsbrück, just before sunrise, but on the Rumer Alpe at 3.30 A.M.; at sunrise at this elevation the thermometer marked 4.4. At Heiligwasser the same kind of relation was noted, and temperature rose after 4 A.M.; but the maximum by day was much lower than at Innsbrück. The high temperature at this station was not due to heating of the ground by sunshine, for a thermometer fixed on the surface of the soil never rose above 1° C. The wind blew uninterruptedly towards the valley, down the mountain side. There remains but one explanation, namely, that the increasing pressure raises the temperature of the air as it descends. Prof. Kerner proceeds to a more detailed analysis of the distribution of currents over hill and valley both by day and by night, illustrating his theory by diagrams. After sunset the ground of the valley and the air above it cool rapidly by radiation. The air thus made specifically heavy cannot flow off, but rests like a lake at the bottom of the valley. The current which has flowed down the mountain sides being raised in temperature, glides over this stratum, and rises about the middle of the valley, to rejoin the polar wind aloft. By day the air ascends from the valley up the southern slope, and is replaced by a current descending the opposite mountain face. Obviously, the phenomenon of increasing temperature with increasing height must be most striking where the ridges and valleys stretch from west to east, and during periods of polar wind, when the sky is clear and radiation strong.

*Der Naturforscher*, January.—This number contains an account of observations by M. von Schleinitz, on board the *Gazelle*, when on the transit expedition to Kerguelen's Land, of changes of temperature and specific gravity of water in the southern Indian Ocean. His conclusions are briefly these:—1. Ocean currents, with the exception of the currents caused by regular winds, are due to differences in absolute specific gravity of different parts of oceans, and a small difference produces a strong current. 2. The differences in saltness of tropical and cold seas (in relation to absolute specific gravity), acting oppositely to the temperature differences, moderates ocean currents, which would otherwise be so strong in meridional directions that navigation would be impossible. 3. There is probably a zone where the differences in saltness compensate the differences in temperature, so that waters of different temperature and different saltness may be near each other in equilibrium, *i.e.*, without perceptible current. In the western part of the Indian Ocean this zone is between 40° and 45° S. lat.—There is a notice of two recent series of researches by M. Voigt and M. Groth (conducted by quite different methods), on the elasticity of rock salt; it is shown that in regular crystals the co-efficient of elasticity, and therewith the velocity of sound, is a function of the direction; and that both vary, in accordance with Neumann's theory, symmetrically with reference to the planes of symmetry of the crystal.—M. Frank calls attention to the action of light on the opening of some catkin-like blossoms.—From experiments by M. Luchsinger, it appears that glycerine injected under the skin of animals has an arresting action on the fermentative formation of sugar from the glycogen of the liver.—The remaining papers do not call for notice here.

*Jahrbücher für Wissenschaftliche Botanik*. Herausgegeben von Dr. N. Pringsheim. Zehnter Band, Drittes Heft, Mit. 11, Tafeln (Leipzig: Verlag von W. Engelmann, 1876).—The present number of Pringsheim's well-known "Year-book" contains three papers, all of great value. The first is by Dr. George Winter, on the genus *Sphæromphale* and its allies (with three plates). Koerber in criticising the Schwendener-Bornet theory of lichens, stated that *Sphæromphale* had only greenish-brown microgonidia, and that the spores did not produce hyphæ. Both these statements are shown to be erroneous, and after a careful anatomical and morphological examination of numerous original specimens, dried and recent, of *Sphæromphale* and its allies, he

groups them together under a single species, *Polyblastia umbrina* (Whlbg.), Winter, and adds nearly three pages of synonyms!—an eloquent tribute to the species-making capabilities of modern Lichenographers.—The second paper is by Dr. A. Engler, Contributions to the knowledge of the formation of the anther in Metasperms. This paper, which is illustrated with five plates, describes the following subjects: (1) the anthers and pollen of the Mimoseæ; (2) the anthers of Orchidaceæ; (3) the anthers of Asclepiadaceæ; (4) on the so-called introrse and extrorse anthers; (5) on certain apparent departures from the type in the formation of stamens; and (6) on the homologies between stamen and carpel.—The third paper is by Dr. J. Reinke, Contributions to the knowledge of Fucaceæ and Laminariæ (with three plates). The anatomy and external construction of several genera and species are detailed, the most interesting portion of the paper being the paragraphs devoted to secondary circumferential growth in Fucaceæ, and to the formation of adventitious buds.—The illustrations are excellent as usual, and the high character of the *Jahrbücher* well sustained.

*Bulletin de l'Académie Royal des Sciences*, Nos. 9 and 10, contains an article by Van Beneden on the *Pachyacanthus* in the Museum at Vienna. The description of other marine mamifers in other museums is to follow, and the whole are to form an introduction to the descriptions of the allied fossil forms discovered in excavations near Antwerp.

## SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 6.—"Experiments on the Friction between Water and Air." By Dr. Ritter von Lang. Communicated by N. Story Maskelyne, F.R.S., Keeper of the Mineral Department, British Museum.

The method adopted for estimating the mutual friction of water and air consisted in connecting a glass tube of 8 centims. in length and 0.72 internal diameter with the pipes which supply Vienna with water at a pressure of four atmospheres. Arrangements for securing a vertical position for the tube ensure a perfectly continuous jet, devoid of any broken surface; and a tube surrounding this jet, with its axis coinciding with that of the jet, acts as an aspirator into and along which air is drawn through a lateral feeding-tube. The amount of this in-drawn air corresponding to the fall of a given amount of water was determined by observing the rate at which a film of soap was borne along the feeding-tube; and the velocity of the water causing the in-draught was calculated from the diameter of the water-column and the quantity of water discharged along it in a given time; but after having once determined the form of the slightly conical water column, the amount of water discharged was the only datum required for the calculation.

The influence of a greater or less section of the air feeding-tube on the volume of the aspirated air was carefully determined, while also the absence of any appreciable retardation due to the soap-film was established.

Neglecting the slightly conical character of the surface of the water-column, and assuming (as the result of experiments in which the motion of a smoke-cloud was observed) that the movement of the air was throughout in lines parallel to the axis of the tube along which it flowed, and showing that the pressure does not vary along the length of the tube, the author proceeds to discuss the hydrodynamic equations expressing the conditions of the problem (the motion of the air being uniform and independent of time), and represents the volume of air A passing through the tube in a second as

$$A = W \left[ \frac{R^2 - r^2}{2r^2(\log R - \log r)} - 1 \right],$$

W being the weight of water, in grammes, discharged in a second,  $r$  the radius of the jet in turns of the micrometer-screw (6.8 turns of which correspond to 1 centim.),  $R$  being the radius of the aspirating tube.

The results obtained by observation accorded well with those given by this equation, so long as the value of  $R$  did not exceed the limit within which the suppositions regarding the motion of the air hold good.

The question whether the results might not be brought into even closer accord with theory by the assumption that a slipping action takes place between the air and the water-jet on the one hand, and between the air and the tube on the other, instead of the assumption previously made that the air adhered